

The present experiment was designed to investigate the digestion of fat and fatty acids along the intestinal tract of broiler chickens fed diets supplemented with either soybean oil or tallow. Broilers (2 weeks of age) were fed corn-soy based diets containing 5% soybean oil or tallow for 7 d and, digesta were collected from duodenum, upper jejunum, upper ileum and lower ileum. Apparent digestibility coefficients were calculated using titanium marker ratios in the diet and digesta. Digestibility of fat was determined to be highly negative in the duodenum, indicating marked net secretion of fat into this segment. Fat was rapidly digested and absorbed in the jejunum, with digestibility coefficients of 0.60 to 0.65 being determined at the end of jejunum. The digestion and/or absorption of fat continued in the ileum. The digestibility coefficients of fat in soybean oil and tallow diets at lower ileum were 0.82 and 0.74, respectively. The main fatty acids secreted into the duodenum were palmitic (16:0) and stearic (18:0) acids, as indicated by their highly negative digestibility coefficients. There was some net secretion of oleic acid (18:1), but no secretion of linoleic acid (18:2). Linoleic acid was absorbed throughout the intestinal tract, while the digestion and absorption of palmitic, stearic and oleic acids start only in the jejunum. Measurements at lower ileal level showed that the unsaturated fatty acids (linoleic and oleic acids) were well digested (0.90 to 0.94), irrespective of the source of fat. In contrast, it was found that the digestibility of saturated fatty acids (palmitic and stearic acids) was influenced by the fat source. Digestibility coefficients of palmitic and stearic acids at lower ileum were markedly higher in the diet containing soybean oil (0.77 to 0.85) compared with that containing tallow (0.58 to 0.68). This finding can be attributed to the natural emulsifying action of high concentrations of unsaturated fatty acids present in the soybean oil diet and, may highlight the potential usefulness of supplemental emulsifiers to improve fat digestion in diets containing tallow.

Key Words: fat, fatty acids, digestibility, broilers

578 Apparent digestibility and metabolizable energy content of lipid sources in poultry. M. Frikha¹, J. Alcaniz², J. J. Mallo², M. P. Serrano¹, and G. G. Mateos^{*1}, ¹*Departamento de Producción Animal, Universidad Politécnica de Madrid, 28040 Madrid, Spain*, ²*I+D Norel Animal Nutrition, S.A, 28007 Madrid, Spain*.

A trial was conducted to determine the apparent digestibility (ATTD) and AME content of different lipid sources in 21d-old broilers. There were a control diet based on corn and soybean meal without any supplemental fat and 6 additional diets forming a 3x2 factorial with 3 sources of fat (soy oil, SBO; reconstituted monoglyceride oil, RMG; and reconstituted triglyceride oil, RTG) included in the diet (3 or 6%) at expenses (wt:wt) of the basal diet. The RMG and RTG were obtained from Norel S.A. and resulted from a proprietary process that consists on a sterification reaction from glycerol and oleins from the soy and sunflower oil industry. The linoleic acid content was 56, 45, and 42% and the GE was 9.47, 9.08, and 9.21 Mcal/kg for the SBO, RMG, and RTG, respectively. Each of the 7 diets was replicated 6 times (cage with 10 chicks). Broilers were fed a common commercial diet from 1 to 6 d of age and then their respective experimental diets from 6 to 21 d of age. Excreta was collected the last 2 d on trial and the ATTD of fat was determined using 2% celite as acid insoluble ash. The AME was calculated by multiplying the GE by the ATTD of the experimental fats. Data were analyzed as a completely randomized design. Ether extract digestibility was lower for the basal diet (77.6%) and highest for the diets that included 6% fat (ranging from 90.7 for RTG to 89.9 for RMG; $P \leq 0.001$) than for the diets that included 3% of fat. The AME content of the fats tested were higher ($P \leq 0.05$) for the SBO than for the RMG with that of RTG being intermediate. The main reason

was probably the lower GE content of these 2 reconstituted oils. It is concluded that the reconstituted oils are as well digested as the SBO but that the AME is lower. Thus, both products can be used in substitution of SBO in diets for broilers.

Key Words: broilers, lipid sources, fat digestibility, metabolizable energy

579 Nitrogen-corrected apparent metabolizable energy of poultry oil for broiler chickens. E. J. Kim^{*1} and W. A. Dozier III², ¹*ARS-USDA Poultry Research Unit, Mississippi State, MS*, ²*Department of Poultry Science, Auburn University, Auburn, AL*.

This research determined the nitrogen-corrected apparent metabolizable energy (AME_n) of poultry oil for broilers at 2, 5, and 8 weeks of age. Two energy balance trials utilizing straight-run Ross × Ross broilers were conducted. Two experimental diets were formulated; one was a low energy corn-soybean meal basal diet (2,826 kcal/kg) and a second comprised of 94% basal diet with 6% poultry oil. Identical diets were fed to each age group to make comparisons across ages. Birds were raised in floor pens until d 10, 31, and 52 and then randomly allocated into 8 battery cages per treatment with group size differing with age. After an adaptation period, birds were fed diets and excreta were quantitatively collected over a 3 d period. Gross energy of the feed and the excreta were analyzed and AME_n was then subsequently calculated by subtracting the AME of the basal diet from the AME of the experimental diet with added poultry oil. To increase replicates, 2 trials were conducted and the effect of trial was analyzed as a statistical factor. The effect of trial × treatment was significant ($P < 0.0001$), therefore, trials were analyzed separately. In Trial 1, AME_n of the basal diet at 2, 5, and 8 wk of age was determined at 3,174, 2,978, and 3,038 kcal/kg DM, respectively. Apparent ME_n for the poultry oil with broilers at 2, 5, and 8 wk of age was 10,730, 10,949 and 10,261 kcal/kg DM, respectively. No differences were observed for age ($P = 0.981$) or interaction between treatment and age ($P = 0.561$). In Trial 2, AME_n of the basal diet at 2, 5, and 8 wk of age was determined at 3,010, 2,969, and 2,862 kcal/kg DM. Apparent ME_n for poultry oil with broilers at 2, 5, and 8 wk of age was 10,183, 9,242, and 12,516 kcal/kg DM, respectively. Age effects ($P < 0.0001$) and interactions between age and poultry oil addition ($P = 0.01$) were apparent. Apparent ME_n of poultry oil may be higher than previously reported and be affected by age; however, these results were inconsistent between trials.

Key Words: metabolizable energy, poultry oil, broilers

580 Characterization of the intestinal microbiota of chickens with deprived growth. C. Eyng^{*1,2}, AA Pedroso², and MD Lee², ¹*Universidade Estadual de Maringa, Maringa, Parana, Brazil*, ²*The University of Georgia, Athens*.

Chickens that are correctly managed, from the same poultry house and receiving the same diet should exhibit similar performance. However, this is not observed in the commercial houses. It has been proposed that the acquisition of nutrients is influenced by the intestinal microbiota. Here we hypothesize that the intestinal microbiota is different between chickens exhibiting good and poor performance. Cecal samples were collected from 15 d old chickens with average live weight of 454 and 183 g, respectively. The cecal bacterial community was characterized using fluorescent *in situ* hybridization (FISH) and fluorescent activated cell sorting (FACS). We detected no differences in the proportion of bacteria belonging to the *Clostridial* cluster I and II (probe Chis150),